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ABSTRACT

Phase 2 of Project IN-STEP was conducted to revise, refine, and conduct further field testing of a new inservice teacher education model. The method developed (in Phase 1--see ED 003 905 for report) is an individualized, multi-media approach. Revision activities, based on feedback provided for Phase 1, include the remaking of six videotape lessons, development of an "Action Handbook" to supplement them, and revision of the 200-page self-study programed text. An elementary science curriculum, "Science--A Process Approach" (AAAS Science), provided the content for the development of the model. During the 1969-70 school year 511 elementary school teachers in Palm Beach County and Alachua County, Florida, were admitted to IN-STEP training programs in AAAS Science. Both experimental and control groups were pre- and posttested with the Elementary Science Teachers Inventory (Lane). Analysis of data serves to further confirm the hypothesis suggested by the results of Phase 1: that the IN-STEP approach is an effective and efficient method of conducting inservice training (at least in AAAS Science). Conclusions were based on results obtained from Phase 1 and statistically significant gains in group mean scores of all the experimental instructional groups during Phase 2 (1969-70). (Author/JS)

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# EVALUATION REPORT

## PHASE II

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## Individualized In-Service Teacher Education

## (PROJECT IN-STEP)

An ESEA Title III Project (P.L. 89-10)
SDE No. 2320-50-69001

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## ACKNOWLEDGMENTS

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July, 1970
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# INTRODUCTION

Increasing demands upon teacher's time resulting from the proliferation of new curriculum innovations and the desire to increase educational efficiency have caused new complexities for in-service training of teachers. School systems and universities are faced with the problems of training large numbers of teachers while saddled with the twin dilemma of insufficient funds and inadequate numbers of qualified personnel to conduct acceptable in-service programs.

An alternative to this predicament is shown in the development of Project IN-STEP. The solution proposed by IN-STEP involves an individualized, multi-media approach for teacher training. When this model is utilized an added benefit is accrued. This is a very effective method for implementing modern curriculum developments on a large scale in a short time. The vehicle chosen for developing and testing the model during the first two years of the program (Phases I and II) was the contemporary elementary science education program, Science - A Process Approach.

## SYNOPSIS OF PHASE I

During the early fall of 1968, 320 Palm Beach County teachers were pre-tested and placed in various prescribed instructional groups. There were four instructional groups and each group received varying amounts of instruction depending upon the proficiencies displayed by the pre-test. Those teachers who were placed in Instructional Group I served as a control group to assist in measuring the effectiveness of the program. The teachers were instructed by means of:

1. Video tapes
2. Self-study programmed text materials.
3. Classes conducted by the IN-STEP instructors in which the participants actually used the AAAS classroom materials in a "hands on" type of approach.

At the end of the academic year 1968-69 the teachers were post-tested and a random selection of their students were also post-tested along with a random selection of matched students of teachers outside the program. The following instruments were used in the specific evaluation:

A. Teacher Participants
   1) Pre-test (elementary science teachers inventory)
   2) Post-test (elementary science teachers inventory)
   3) Teacher Attitude and Opinion Survey (Project IN-STEP Teacher Questionaire)

B. Students of Teacher Participants
   1) Process Measure (Observation)
   2) Student Attitude (Q-sort)

Analysis of the data from the Phase I testing program suggests the acceptance of the hypothesis that the IN-STEP "approach" is a successful method for conducting in-service training of teachers (at least for AAAS Science). This statement is based upon the following observations:

1. Gain in the mean scores of Instructional Groups II, III and IV, generally at the .01 level of significance, due to the instructional program.

2. The generally favorable attitude of the teachers who participated as reflected in the questionaire.

3. The cost effectiveness comparison between training a hypothetical group of 300 teachers in AAAS Science with IN-STEP materials as compared with a traditional approach to training a like number of teachers.

4. Indirect measure of teacher effectiveness in instructing students in the materials and methods gained from participating in Project IN-STEP training. Second grade students of participants showed a difference in the mean on the observation process measure when compared with a matched control group. The difference was significant at the .01 level.

5. A moderately favorable indication of a difference in the attitude towards science in sixth grade children (only grade surveyed with Q-sort means) whose teachers were trained in AAAS Science via the IN-STEP program compared to a random sampling of other sixth grade children in the county.

An abstract of the evaluation report on Phase I was published by ERIC in the March 1970 issue of Research In Education. The full text of the report can be obtained from ERIC at nominal cost. The report is available in either microfiche or hard cover. The results obtained from Phase I indicated that the pursuit of the Phase II objectives should prove worthwhile.

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## GOALS AND OBJECTIVES

### GENERAL OBJECTIVE (PROJECT GOAL)

The general objective of Project IN-STEP is to develop an effective, economical model for in-service training of teachers.

The effectiveness is shown in Phases I and II by comparing pre and post-mean scores by participating teachers. The economic feasibility will be demonstrated by comparing costs of training a large number of teachers with the IN-STEP method to the traditional method of extension classes, using one college instructor per 30 participating teachers.

In order to meet this general objective the total project program was divided into three phases of one year each. Each phase has its own operational objectives which lead to meeting the primary goal of the project. The operational objectives for Phase I dealt with the development, implementation and preliminary evaluation of the IN-STEP model (individualized, multi-media approach) for in-service training.

### OPERATIONAL OBJECTIVES

For Phase II the operational objectives were as follows:

1. To revise instructional programs and appraisal techniques in Phase I as indicated by the results of their effectiveness.

2. To evaluate the effectiveness of the instructional approaches by implementing the program with other teachers using the revised procedures and materials and evaluating their effects. This evaluation was to be done by comparing the pre and post-test scores on the Elementary Science Teachers Inventory. A difference in the mean gain significant at the .01 level of reliability was to be considered successful.

## PROCEDURES

### Objective I

In order to meet the points of operational objective #1 for Phase II, the following procedures were undertaken:

1. Six of the videotape lessons were remade.
2. A publication entitled Action Handbook was developed by the project staff. The author was Karl L. Combs, staff instructor for Project IN-STEP. The Action Handbook is designed to strengthen the videotape portion of the instructional program. This is accomplished in the Handbook by involving participants in activities correlated with the videotapes/kinescopes before, sometimes during and always after each telelesson.
3. The 200 page self-study programmed text, written and developed by the project staff was completely revised.
4. A thorough evaluation of Phase I was undertaken. The results of this study are available from ERIC. An abstract of which was published in Research In Education, March, 1970.

### Objective II

In the field testing and evaluation of the revised IN-STEP materials some modifications were made in Phase II. These modifications were due to several factors. Some were suggested in feedback from Phase I. Others were mandated by constraints of available time and funds acting on both the participants and the IN-STEP staff. One example is that although 226 teachers were trained via IN-STEP in Palm Beach County during the 1969-70 school year, there were no local funds available to supply them with teaching materials. This prevented them from implementing the AAAS materials per se. However, this did not prevent them from modifying their behavior somewhat in shifting towards a child-centered process approach in their classroom. It is apparent though that testing the students of these participants as to their acquisition of the skills inherent in AAAS science would not be valid, due to their not having access to the materials. This problem also made use of the teacher questionaire rather unsuitable since many of the questions dealt with the teachers reaction to using the teaching materials in the classroom. The project staff, however, was able to collect much hard data during the 196--70 school year and it is the opinion of the staff that there was more than enough data generated, collected and analyzed to provide a thorough evaluation of Phase II.

There was an interesting variation in the procedures this year in that the materials were also implemented in Alachua County, Florida, as well as Palm Beach County. The procedures for implementing the IN-STEP AAAS materials in these two separate instances are reported in the following sub-sections:

## Palm Beach County

During the 1969-70 academic year in Palm Beach County 226 teachers received AAAS science training via the IN-STEP method. One hundred and ninety-two of these teachers were divided into three instructional groups on the basis of their performance of the Elementary Science Teachers Inventory developed by Dr. Rodney A. Lane, Dean of the Division of Continuing Education, Florida Atlantic University. This instrument served as a pre and post-test in both Palm Beach and Alachua Counties. These 192 teachers began instruction in the fall of 1969. The remaining 34 teachers were placed in a single group regardless of test score. This group was used as a control group and their instruction was begun in the spring of 1970. The treatment of the spring group corresponded to that given Instructional Group I during the 1968-69 field tests. The treatment of the various groups is listed below:

Control (Spring) Group - This group received brief instruction in the philosophy of science education, met a limited number of classes and viewed a limited number of videotapes. Most of their time was devoted to involvement for procedures in unpacking and setting up AAAS teaching equipment. Very little information concerning the processes of Science - A Process Approach was presented to them.

Group I - This group corresponded to the Instructional Group II of the 1968-69 evaluation. They received self-study programmed materials, viewed eight telelessons, and attended eight two-hour classes.

Group II - This group corresponded to the Instructional Group III of the 1968-69 field test. They received self-study programmed materials, viewed 15 telelessons and attended 10 three-hour classes.

Group III - This group corresponded to the Instructional Group IV of the 1968-69 year. They received self-study programmed materials, viewed 30 telelessons and attended 12 three-hour classes.

One variation in the treatment of the instructional groups during the 1969-70 year was the inclusion of more self-study materials. This was done in the form of the Action Handbook.

Alachua County

During the fall and winter of 1969-70, 275 elementary teachers were trained in Science - A Process Approach via IN-STEP materials in Alachua County, Florida.

Based upon the results of the pre-test and also upon the felt needs of the individual teachers, teachers were asked to engage, to varying degrees, in the following aspects of an individualized in-service program:

a. Instruction in the philosophy and mechanics of Science - A Process Approach (via video tapes).
b. Self-study text materials (programmed format).
c. Instruction (rationale and sample lessons) and suggested ways to teach each of the major processes of AAAS Science. These are 25-minute telecasts, each will be aired twice weekly.

This was accomplished by placing the 275 teachers in one of three instructional groups. The pre-test used was the Elementary Science Teachers Inventory.

## RESULTS

### Palm Beach County Statistical Data

Due to the constraints of available time and funds already mentioned in the chapter on procedures, detailed study of only one instructional group was possible. Instructional Group II was decided upon because it corresponded roughly with the Group III of the 1968-69 year. Group III of that year showed the poorest mean gain of the total program so far (significant at the .02 level). Thus it was felt if the revised materials made an improvement in this group this would be significant, and would pose the biggest challenge if only one group could be evaluated.

Table I

Comparison of Teacher Pre and Post-Test Scores

PALM BEACH COUNTY

Unmatched Comparison

Based Upon 52 Test Items

| Group II | Pre-Test | Post-Test |
|---|---|---|
| (Experimental) | N 109 | N 48 |
| Range 14-34 | M 21.85 | M 23.09 |

T= 3.08
significance .01

Matched Comparison

Based Upon 52 Test Items

| Group II | Pre-Test | Post-Test |
|---|---|---|
| (Experimental) | N 48 | N 48 |
| Range 16-27 | M 21.29 | M 23.09 |

correlation .59 T= 5.02 significance .01

RESULTS - Palm Beach County Statistical Data(Continued)

Unmatched Comparison

Based Upon 52 Test Items

| Spring Group | Pre-Test | Post-Test |
|---|---|---|
| (Control) | N 20 | N 26 |
| Range 10-38 | M 22.95 | M 23.36 |

T= 1.17
not significant at the .01 level

Matched Comparison

Based Upon 52 Test Items

| Spring Group | Pre-Test | Post-Test |
|---|---|---|
| (Control) | N 16 | N 16 |
| Range 10-38 | M 20.93 | M 22.25 |

correlation .47 T= 1.96
not significant at the .01 level

Discussion of Teacher Pre and Post-Test Results

Palm Beach County

As was stated previously, due to certain constraints only Group II was selected for comparison with the control group. It may be noted that there are two sets of figures for both the experimental (Group II) and the control group (Spring Group). These are the matched and unmatched comparisons. Unmatched comparisons resulted from either fewer or greater numbers of persons taking the post-test. A matched comparison involves only those taking both the pre and post-test.

In examining the data we find that the control group did not show a significant gain in the difference between pre and post-test mean scores. The experimental group examined (Group II) did show a marked gain in the difference between the pre and post-test mean scores. The difference was significant at the .01 level. This was most gratifying because, for reasons previously stated, it was felt that this group offered the greatest challenge to the IN-STEP instructional material.

The experimental group for 1969-70 had a much larger T (unmatched 3.08; matched 5.02) than the control group (unmatched 2.39, matched not available) for 1968-69. Variables in the instructional program which hopefully accounted for this improvement were the remaking of six videotapes, revising the self-study text and the development and use of the Action Handbook.

## Alachua County Statistical Data

All the participating teachers in Alachua County were pre-tested with the Elementary Science Teachers Inventory. This is a test designed to measure the teachers' general science knowledge and their ability to apply the processes of science to solve problems. Teachers were placed in three instructional groups as follows: Group I, Range 10-22; Group II, range 23-33 Group III, range 34-43.

Table II

Comparison of Teacher Pre and Post-Test Scores

ALACHUA COUNTY

Based Upon 54 Test Items

| | N | $\overline{X}$ pre | $\overline{X}$ post | S.D. diff | $\overline{X}$ post - $\overline{X}$ pre | S.E. diff | t |
|---|---|---|---|---|---|---|---|
| Group I<br>Pre test Range 10-22 | 21 | 17.4761 | 27.5238 | 4.9326 | 10.0476 | 1.1029 | 9.1101 |
| Group II<br>Pre test Range 23-33 | 27 | 28.5185 | 35.1481 | 5.4917 | 6.6296 | 1.0770 | 6.1556 |
| Group III<br>Pre test Range 34-43 | 11 | 37.5454 | 41.7272 | 3.8804 | 4.1818 | 1.2271 | 3.4078 |
| Overall<br>Pre test Range 10-43 | 59 | 26.2711 | 33.6610 | 5.4742 | 7.3898 | 0.7188 | 10.2807 |

All t - ratios are statistically significant at or beyond the $\alpha = 0.01$ level for a two tailed test of significance.

Table III

Frequency and Amount of Change of Pre and Post-Test Scores

ALACHUA COUNTY

| Amount of Change | Group I | Group II | Group III | Overall |
|---|---|---|---|---|
| 0 | 1 | 3 | 2 | 6 |
| +1 | 0 | 2 | 1 | 3 |
| +2 | 1 | 4 | 2 | 7 |
| +3 | 0 | 3 | 1 | 4 |
| +4 | 1 | 2 | 1 | 4 |
| +5 | 1 | 0 | 1 | 2 |
| +6 | 1 | 1 | 0 | 2 |
| +7 | 1 | 1 | 1 | 3 |
| +8 | 1 | 1 | 0 | 2 |
| +9 | 2 | 1 | 1 | 4 |
| +10 | 2 | 1 | 0 | 3 |
| +11 | 3 | 1 | 0 | 4 |
| +12 | 1 | 1 | 0 | 2 |
| +13 | 1 | 1 | 1 | 3 |
| +14 | 1 | 1 | 0 | 2 |
| +15 | 1 | 3 | 0 | 4 |
| +16 | 1 | 0 | 0 | 4 |
| +17 | 0 | 1 | 0 | 1 |
| +18 | 0 | 0 | 0 | 0 |
| +19 | 2 | 0 | 0 | 2 |
| | | | | 59 |

Table IV

Comparison of Teacher Pre and Post-Test Scores

Duval Elementary School

ALACHUA COUNTY

Based Upon 54 Test Items

| Individual Test Results | Pre-Test | Post-Test | Gain |
|---|---|---|---|
| A | 17 | 38 | 21 |
| B | 15 | 36 | 21 |
| C | 16 | 32 | 16 |
| D | 22 | 32 | 10 |
| E | 30 | 45 | 15 |
| F | 38 | 44 | 6 |
| | Mean Pre Test | Mean Post-Test | Mean Gain |
| | 23 | 37.83 | 14.83 |

T= 6.06
significance .01

Discussion of Teacher Pre and Post-Test Results

ALACHUA COUNTY

In Alachua County post-testing was done using a random sample rather than all participants for two reasons:

1. Conclusion of the in-service program coincided with a "teacher shift" which occurred at the beginning of February. This shift concerned the transfer of a large number of teachers involved in a desegregation plan and made it impossible to do any county-wide testing at that time.
2. Total post-testing was not necessary to obtain statistically significant data.

In addition it was possible to show the results from all the participating teachers in one school in tabular form (see Table IV). The participating teachers came from 24 elementary schools in Alachua County. The number of participating teachers (275) represents between 40 to 50 per cent of the elementary teachers in Alachua County. It had been hoped that individual schools within the county could be compared but the desegregation migrations rendered this procedure unfeasible. It was possible, however, to find one school where those teachers involved in the training program did not shift. This school was Duval Elementary school. In testing for significance with the data from this school, Fishers' T test for difference between correlated pairs of means was employed. An obtained + of 6.06 was found to be significant at the .01 level.

## SUMMARY

The purpose for Phase II of Project IN-STEP was to further refine and test the model for conducting individualized in-service training of large numbers of teachers. The method was developed during Phase I and utilized a multi-media approach. The curriculum which served as the vehicle for development and refinement of the model during both Phases I and II was the contemporary elementary science program Science - A Process Approach (AAAS Science). The results from Phase I showed the model met three criteria which were to be considered the measures of its success. These were that it be: 1) Effective 2) Economical and 3) Efficient. Phase I was conducted during a 12 month period from July 1, 1968 to June 30, 1969. Phase II began July 1, 1969 and extended to June 30, 1970. Phase III is scheduled to run from July 1, 1970 to June 30, 1971.

The two operational objectives for Phase II were: 1) To revise instructional procedures and materials based upon feedback provided from Phase I. 2) To field test the revised instructional program by implementing it with additional groups of teachers.

Teachers in two Florida Counties (Palm Beach and Alachua) were pretested in the early fall of 1969 and placed into various instructional groups as prescribed by the project. A control group was run in Palm Beach County during the spring of 1970. Teachers were instructed by means of :

1. Videotapes
2. The Action Handbook
3. A Programmed Self-study Text
4. Classes in which they actually utilized AAAS classroom materials

At the end of the training sessions approximately 236 elementary teachers in Palm Beach County and 275 in Alachua County were post-tested with the Elementary Science Teachers Inventory.

Analysis of the data from Phase I suggested acceptance of the hypothesis that the "IN-STEP approach" is a successful method for conducting in-service training of teachers.

During During the 1969-70 academic year the operational objectives for Phase II were met and the field-testing portion of the evaluation adds further credence to support the concept that the "IN-STEP approach" is a valid method for the conducting of in-service education (at least for AAAS Science). This statement is based upon:

1. The results obtained from Phase I of the program.
2. The gain in the mean scores of the fall instructional group, tested in Palm Beach County, on the Elementary Science Teachers Inventory. This was significant at the .01 level.
3. The gain in the mean scores of the instructional groups in Alachua County on the Elementary Science Teachers Inventory. This was significant at the .01 level.

During the 1969-70 academic year the operational objectives for Phase II were met and the field-testing portion of the evaluation adds further credence to support the concept that the "IN-STEP approach" is a valid method for the conducting of in-service education (at least for AAAS Science). This statement is based upon:

1. The results obtained from Phase I of the program.

2. The gain in the mean scores of the fall instructional group, tested in Palm Beach County, on the Elementary Science Teachers Inventory. This was significant at the .01 level.

3. The gain in the mean scores of the instructional groups in Alachua County of the Elementary Science Teachers Inventory. This was significant at the .01 level.

4. The fact that of all the instructional groups tested in two years of operation only one did not obtain results statistically significant at the .01 level and that one (Group III, 1968) obtained a reliability at the .02 level.

Although there was not an attempt to evaluate students in a formal manner in Phase II, extrapolation based upon student performance and attitude in Phase I, teacher's attitude measure in Phase I and direct questionings of those involved in Phase II points to a very meaningful consideration. Of the approximately 831 teachers (556 from Palm Beach County; 275 from Alachua County) trained with IN-STEP materials, 98% have modified their classroom behavior somewhat, and 69% have made more than nominal changes in their classroom behavior. It is at once apparent the real beneficiaries of these behavioral changes resulting from two years of Project IN-STEP are the more than 20,000 students in their classes.

Since Phase III will involve instructing teachers in classroom management techniques that will be applicable to any subject area, it is presumed that personal effect on students will be multiplied many times.